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TECHNOLOGY TRANSFER ADVISORY COMMITTEE

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Municipal Reference

March 26, 1984

To: Neighbourhoods Committee

Subject: Report of the Technology Transfer Advisory Committee

Origin: Technology Transfer Advisory Committee

Background

At its meeting of September 6, 1983, Toronto City Council approved the formation of a Technology Transfer Advisory Committee. The Committee was to have representatives from industry, labour, the academic/research community and City Council. The Committee was to report on the opportunities for technology transfer between centres of technological expertise and industry in the City of Toronto and to recommend an appropriate role for the City to enhance this process.

The Need for Concern

The serious structural problems facing the entire traditional manufacturing sector are well known, and widely discussed. Plant closures and the loss of industrial jobs are of great concern. Many have suggested that Canadian industry must become more productive in order to remain competitive in world markets. For Toronto firms, the majority of which are relatively mature and small, the need to become more productive and in many cases the need for new product development and expanded markets may be particularly urgent.

Toronto's printing and publishing industry employs 13,600 people, approximately 22% of all manufacturing employees in the City. As reported to the Committee, this industry has been undergoing a rapid transformation with the introduction of computers and advanced data transmission technology. Technological changes will continue to be extensive in this field. The food and beverage industry currently employs 13.5% of the City's manufacturing work force (8,400 people) and is increasingly subject to technological change. The textile and garment industry employs over 10,000 people in Toronto (18%) and faces continuing competitive pressure from Third World countries. Technological change in this industry poses special challenges.

The City has well-developed centres of technical expertise in the three major educational institutions which could help industry to cope with changing technology. The Innovations Foundation at the University of Toronto, The Centre for Industrial Development at Ryerson Polytechnical Institute and George Brown College are already working with industry to develop and introduce new technology and re-train workers but greater linkage between

industry and the sources of research is needed. Whether or not the City has a role to play in bringing local industries and institutions even closer together was the central question of the Technology Transfer Advisory Committee.

Terms of Reference and Composition

To answer this question, the Committee orginally proposed to examine four issues.

1. What are the specific needs and opportunities for technology transfer within the City's industry?

2. How much of the current R & D activity within the universities and colleges is directly applicable to the needs of industry?

3. Is there a greater opportunity to direct institutional R & D to industrial applications.

4. What future strategies are needed to realize that opportunity?

The Committee decided to broaden these terms of reference to examine how new technology-based firms and entrepreneurs in Toronto could be encouraged. Also some Committee members felt technology transfer has serious implications for labour displacement and worker skills, and a more comprehensive discussion was included on the impacts of new technology on workers. It became apparent that the time constraints on the Committee would result in only a preliminary analysis of the issues.

The Committee was composed of members of the three largest industries in the City, members of organized labour, the research and educational community and representatives from City Council. In this way, a balanced perspective on the needs, mechanisms and effects of technology transfer would be gained. The members of the Committee were as follows:

- Alderman J. Sewell (Chairman)
  City of Toronto

- Alderman M. Gee
  City of Toronto

- Alderman R. Gilbert
  City of Toronto

- Mr. W. Howes
  National Representative
  Communications Workers of Canada

- Alderman R. Kanter
  City of Toronto

- Mr. C. S. Kuzik
  Executive Director
  Toronto Dress and Sportswear Manufacturers Guild

- Mr. K. Laxon
  Vice-President, Operations
  William Neilson Ltd.

- Mr. J. R. Michie
  Dean, Industrial Training and Continuing Education
  George Brown College

- Mr. C. H. Rosier
  Director, Centre for Industrial Development
  Ryerson Polytechnical Institute

- Dr. G. R. Slemon
  Dean of Applied Science and Engineering
  University of Toronto

- Mrs. B. Torrie
  President
  Atwell Fleming Ltd.

- Mr. J. Turk
  Research Director
  United Electrical Workers' Union

- Ms. H. Webster
  Research Director
  Amalgamated Clothing and Textile Workers

Committee Activities

The Committee meetings were organized topically so each session would focus on one aspect of the issues surrounding technology transfer. Sessions were devoted to exploring industry's needs for technology, the availability of research and technology in Toronto institutions, technological impacts on workers, opportunities for new technology industries and selected government assistance for technology transfer. Each of the meetings were structured to provide detailed discussion as well as more wide-ranging debate on each issue.

The following sections summarize the presentations by Committee members and outside resource people who were invited to address the Committee.

A. Industry Perspectives

The presentations by the industry representatives generally agreed that technological change is necessary and that industry is moving, in some cases very quickly, to adopt new innovations. The major factors that encourage technological innovation and adoption are competitive pressure from rival firms, both domestic and offshore, high labour and distribution costs and in some industries, the trend to restructure and consolidate in larger and fewer plants.

Other factors emerged as possible impediments to technology adoption. The small size and limited scale of production in many firms hampers the adoption of new technology which is often geared to high-volume, large scale plants. Family-owned or closely held companies may also be less inclined to adopt costly new technology if financing its purchase means giving up equity. An uncertain economic future for an individual firm or an industry as a whole will also inhibit the transfer of new technology.

There are exceptions to the general situation however. The printing industry is characterized by many small family-owned businesses. This creates a very competitive industry which necessitates constant technological upgrading to remain competitive. Unlike most other industries, new computer-assisted equipment has advanced to the point where the costs are low enough to enable even small firms to adopt new machines.

The food and beverage industry is undergoing rationalization and restructuring. Formerly an industry with a large number of local producers, the industry is consolidating into a smaller number of large regional firms. These larger units are adopting new technology in order to earn economies of scale and offset the high wage and distribution costs of the industry.

The garment industry is faced with a special challenge. It is generally a labour-intensive industry and is faced with an uncertain economic future. Federal government trade policy has opened the Canadian market to low cost imports of both textiles and finished garments. This has resulted in a substantial price differential between offshore and Canadian products. Much of the offshore product is manufactured using both advanced machinery and low cost labour which means that although the technology is available to Canadian firms, technological upgrading alone may not be sufficient to achieve competitiveness.

In general, local industry will look for new technology through its own industry association or from other technological "lead firms" in the industry. Except for a few very large firms in Toronto there is a low level of awareness of what local institutions can provide in terms of technology.

Role of Educational Institutions

The role of the educational institutions in technology transfer varies between institutions. Generally speaking George Brown College and Ryerson Polytechnical focus on existing technology and industrial training. The University of Toronto, because of its orientation to academic training, concentrates on basic or fundamental research but also does applied research for industry.

Ryerson has set up the Centre for Industrial Development to work primarily with small firms who cannot afford either advanced technology equipment or in-house research and development staff. Ryerson does little original research itself, rather it works with industry on practical production-related problems and staff training. Recently, they have received a federal grant to expand their services in computer-aided design and computer-aided manufacturing (CAD/CAM) technology. The Centre can also provide small grants to researchers and some new product development in the area of industrial robotics has been done.

The mandate of George Brown College is to train people in specific skills to prepare them for employment. No research and development is undertaken or encouraged within this institution. However, George Brown plays a significant role in technology transfer by providing students with "hands-on" training in the newest available technologies. Many of the students come from, or are hired by, local industry thereby facilitating technology transfer.

There are, however, limitations to the ultimate role these institutions can play in fostering technological change in industry. Training is often provided in the areas of greatest need and these are not always "high technology"(i.e.: diesel engine repair or welding). Secondly, the institutions do not have the resources to continually upgrade their teaching systems and equipment to train students on the latest technology. In some areas, technology is changing so quickly that a commitment to "state-of-the-art" equipment would mean yearly replacements of existing machines and equipment.

Another factor that limits the effectiveness of George Brown and Ryerson in facilitating technology transfer relates to scale. Small firms are often most in need of technological upgrading and employee training. However, small companies cannot usually afford

to lose key employees or pay for the costs of training. Some efforts have been made to make it easier for small firms in this regard; for instance a small firm may not be able to lose a key machine operator for two months of training, but the college will train the person for one day over forty weeks. However, the scale problem is still a major obstacle. Generally speaking, the demand for re-training exceeds the capabilities of these institutions, and they must concentrate their resources in areas of greatest need.

The University of Toronto shares many of the same problems, especially underfunding and excess demand for certain courses and programs. However, in respect to technology development, the university thrust is quite different than either of the other institutions. The university has an academic rather than vocational orientation. Much of the research that is done is directly related to teaching and academic priorities. At present, there is limited opportunity for industry to "tap into" university research and advise professors what kind of research might have an immediately practical application. Basic research has traditionally been at the discretion of individual professors and dependent on the availability of funds which are controlled by a peer-review system or by individual contracts with industry.

In recent years, efforts have been made to consider possible industrial applications when setting research priorities. The Innovations Foundation at the University of Toronto is one such effort. It was established to license and market new technologies developed at the University. However, for industry to benefit more fully from research being done at the university there must be closer linkages, especially when research priorities are being established. Industry should also support a greater share of the costs to carry out research if it is to benefit directly from it.

Representatives of academic institutes agreed with industry representatives that there is in general, a lack of co-ordination between City firms and City institutions. There is a definite opportunity to bring industry and academe closer together in certain areas.

Organized Labour

The representatives of the trade unions were concerned primarily with the technology to be transferred, rather than the mechanisms. They reject the notion that technological upgrading is universally beneficial, and propose that technology should be evaluated on the basis of its net effect on workers and society as a whole. As labour views it, technology creates four basic problems:

1) Technology replaces labour and usually means fewer jobs after the new technology is in place.

2) Technology often has a de-skilling effect, particularly in the areas like computer-aided design and manufacturing.

3) Technology often leads to centralized control of the workplace. Management can maintain closer scrutiny of work in progress and workers' ability to control their own job is reduced.

4) This centralization of management control has progressed to the point where dominant trans-national corporations which control the technology can control the location of the workplace and thereby influence the governments of the countries where these workplaces are located.

Organized labour has stressed that they are not anti-technology. New technologies are the instruments of these changes, but not the cause. They have also stated that the entire question of technology transfer encompasses too many factors to be effectively dealt with over the span of eight Committee meetings. However, the labour representatives did make several suggestions as first steps for the City of Toronto in dealing with the effects of technology transfer.

1) Although the role of the City is limited, the City should re-define its concern for technology transfer as more than merely a facilitator and establish a task force to assess the effects of technology on the City.

2) The City should act as advocate and encourage its industry and research institutions to adopt technology which is not adverse to workers' needs.

3) The City should set an example to others by granting its own employees the right to bargain over the introduction and use of technology in the workplace.

It was also noted that in some European countries, particularly Norway, government regulations require that companies supply union representatives with information on new technology so that it is only introduced after substantial labour-management discussion.

B. Outside Participants

Five experts were invited to address the Committee. Dr. Sandy Lowden from Hospital for Sick Children and Jim McPherson, Chief Executive Officer of the Canadian Industrial Innovation Centre/Waterloo, spoke on opportunities for new technology-

intensive industries. Brian St. John, the President of IDEA Corporation, Peter Barnes, General Manager, Ontario Technology Centres and Tom Torian, Regional Director of the National Research Council addressed the issue of government support programs for technology transfer.

HSC Corporation

HSC Corporation was established by the Hospital for Sick Children in 1983 as an arms-length corporation. Its purpose is to assist in the development and marketing of new products and processes patented by hospital staff. A separate company was required to be eligible for National Research Council funds to develop these products for market. The company has already developed some products to the market stage and has identified several constraints.

The market for high-technology products such as sophisticated intravenous pumps or complex hospital management software is very small in Canada. This presents a serious problem because the product development funding provided to the company by the National Research Council required that the final product be marketed first in Canada. Moreover, the number of Canadian firms that would be able to produce these kinds of products on a commercial scale is extremely limited. As an example, HSC staff sent out the specifications for the manufacture of a piece of high technology hospital equipment to a variety of Canadian and American firms. Only one American firm responded; no Canadian firms were financially able to take on production of such a high value, but low quantity product.

This underscores the problems facing technical entrepreneurs in Canada. Although some government assistance is usually available to help during the development stages of a new product, the Canadian market is usually too small to sustain commercial scale production. The company has decided that licensing and joint ventures may be a more appropriate means to develop and market these types of products.

Canadian Industrial Innovation Centre/Waterloo (CIIC/W)

The CIIC/W was originally set up by the University of Waterloo with federal government funding as an outgrowth of the university's contract research activities. The aim of the CIIC/W is to act as a technology transfer bridge between the University of Waterloo and industry. It does this by directly assisting new entrepreneurs and firms involved in innovation and new product development. The Centre provides financial, administrative and management support to entrepreneurs during the time between a product's inception and ultimate commercial production. This

period is critical to the success of all entrepreneurs and is particularly important for technology-intensive products because they have higher risk of market failure.

The Centre also facilitates the transfer of university-held technology to existing industry by acting as a technology broker and licensing company. As part of this role, the Centre has established a separately incorporated venture capital company.

A major part of the Centre's operation is the provision of workshop or "incubator" space. "Innovation Place", as it is known, provides a business address, certain business services and reduced rent for entrepreneurs.

Although separate, the Centre remains closely and formally associated with the university. The applicability of this idea to Toronto was discussed and generally well accepted. A Toronto-based Innovation Place would likely incorporate incubator space for new entrepreneurs as well as additional commercial floor space for related support activities such as lawyers, accountants and venture capital firms. Such a facility would need to be located near the university and other sources of new product ideas to facilitate close personal contacts during the start-up phase of a new technology venture.

The IDEA Corporation

The IDEA Corporation was recently established under statute by the Ontario government as part of the BILD program. Its prime function is to act as a venture capital firm and to make funds available for technology development projects in Ontario. IDEA has been initially capitalized at $107 million over five years, which, by venture capital industry standards, makes it a very large company. The company will use its financial strength to lever additional private capital into five distinct technology funds. These are:

- Biological and Medical Technology Fund
- Chemical and Process Technology Fund
- Information Technology Fund
- Machine and Automation Technology Fund
- Microelectronics Technology Fund

These funds will be separately incorporated and are intended to work through joint ventures with the private sector to spread risk and provide necessary venture capital in projects where the

private sector alone is unable or unwilling to participate independently.

In addition, IDEA provides funds through the IDEA Research Investment fund and an Innovation Fund for basic research and for projects which do not fit into one of the five primary investment funds.

IDEA also serves as a "technology broker" by sourcing and licensing technology to Ontario industry. By virtue of having staff members with experience in both the venture capital and research communities, IDEA has access to a wide network which it can tap into to help make assessments of new technology for licensing or investment.

IDEA has a mandate to assist in the transfer of technology to smaller firms. They would welcome City input to determine what their role would be in local technology transfer.

Ontario Government Technology Centres

A number of advanced technology centres have been set up throughout the province under the BILD program. The primary role of the centres is to assist in the transfer of new technology to existing Ontario industry. There are six centres in the following fields: CAD/CAM (Computer Aided Design/Computer Assisted Manufacturing), Robotics, Microelectronics, Auto Parts, Agriculture and Food Processing and Resource Machinery.

Each of the centres undertakes four specific functions.

1) Awareness/Marketing: To provide industry, especially smaller firms with an improved awareness of the technology available to them and to publicize the role of the centres.

2) On-Site Advice/Counselling: As an impartial third party, the Technology Centres can provide field engineers to advise on the feasibility and technical details related to the installation of new technology.

3) Training: The Centres provide general seminars and more specific training courses in an effort to prepare firms to provide their own in-house training in advanced technology.

4) Resource Centre: Each Centre acts as a resource centre and information clearing house in their particular technological field.

The Centres have been operational only for a year and are still making initial business contacts. They acknowledge that it is

still too soon to assess the effectiveness of the Centres in fulfilling their mandate, however, they are expected to be self-financing within five years. In order to provide a worthwhile service to industry, each Centre has recruited specialists from industry in specific fields. Consulting services are provided at market rates.

The BILD Centres recognize that at this stage they are dealing mostly with firms that are willing to accept change. However, the real challenge is to provide older firms with the expertise to develop new products and markets. Providing firms with new technology to perform existing production activities more efficiently is a worthwhile short-term objective but the long-term objective is to help older firms restructure.

National Research Council

The NRC is the primary research and technology transfer agency of the federal government. It provides services to industry through a number of programs. The Industrial Research Assistance Program (IRAP) provides financial support to qualifying industry on a 50-50 basis for research and development activities. The NRC also maintains a technical information service so that companies may obtain information on current research. It provides information on a regular basis on the latest technological developments on a world-wide basis and it runs symposia on new research. The NRC does not directly sponsor university research, however, it will provide subsidies to companies to have contract research done at a university. In recent years, there has been political pressure on the NRC to direct more resources to applied research and to spend less on basic scientific inquiry. A shift towards applied research would mean more emphasis on adapting existing technologies to industrial uses, but the long-term effect of this kind of emphasis would be to limit the number of new scientific discoveries which typically emerge from basic research.

The NRC has a mandate to deal with all companies, but typically firms with gross sales of less than $2 million or fewer than 25 employees have not been able to effectively use NRC services. In most cases, these smaller firms have had to rely on other federal and provincial government programs.

NRC has established several research laboratories outside of Ottawa. There is a materials lab in Montreal and a CAD/CAM centre in Winnipeg and there is interest in establishing a lab in the Toronto area. It is not known at this point whether such a lab would be linked to certain industries (i.e.: food processing or transportation) in this region or if it would serve a broader national interest.

In terms of technology transfer at the local level, the NRC can assist industry through existing programs. However, some Committee members felt the NRC should develop closer ties with the universities to help encourage a greater amount of industrial applied research within university laboratories.

3) Findings and Recommendations

Within its terms of reference, the Committee has attempted to deal as fully as possible with technology transfer in the City of Toronto. It has not simply been the task to see how the City can facilitate more technological upgrading in its key industries although this is an important task. The Committee has tried to focus on the sources of new technology within Toronto, the mechanisms by which technology can be transferred to industry and the effects of the technology on industry and workers. The findings and recommendations of the Committee reflect this broad concern.

The Committee has found that technology transfer embraces a wide range of issues and poses challenges for all sectors of Toronto's economy. In the course of discussion, several themes emerged. These are summarized below.

1) The mechanisms and implications of technology transfer are very complex and this Committee has only begun to grapple with the issue.

There are alternative points of view on how to manage the transfer of technology and what types of technology should be encouraged. One school of thought is that the technological transformation of the economy should be encouraged as fast as possible in order to ensure competitive productivity nationally and internationally. Another view is that the introduction of technology results in disruptions within the labour market and in the society, and accordingly such changes must be monitored carefully and regulated. It might be appropriate to view particular technologies as embodying social values, either "good" or "bad".

The Committee acknowledged that it had fulfilled its specific mandate and that a more complete study of the value questions involved in technology transfer would clearly be beyond the capabilities of the present Committee. The issue is exceedingly complex and the City must attempt to understand and be informed on an ongoing basis how technological change affects the City's economy.

2) Toronto industry will be required to accept new technology, whether because of competitive pressure or improved productivity, or because of the production requirements of other firms.

Many of Toronto's industries are older and are facing increased domestic and international competitive pressures. Increased productivity is one response to these pressures. It is clearly recognized that many factors besides technological improvements, such as changes in demand, manpower skills and different management practices, affect productivity. Nevertheless, technical innovation does enhance the quality of capital and often results in improved organization of production. Therefore, productivity changes are an important function of technological change. Many firms assume that a failure to upgrade plants and equipment likely will result in an uncompetitive situation resulting in plant closures and the loss of jobs and manufacturing capacity.

A good example of changes posed by new technology is the relationship between General Motors Corporation and its many parts/components suppliers. G.M. has now adopted a "just in time" inventory system which demands that suppliers closely and accurately monitor their own production lines to match their output with G.M.'s demand at any given time. Moreover, G.M. now furnishes all the technical and design specifications for component parts to its suppliers in digital or machine-readable form. This requires the supplier firms to adopt a computer-aided manufacturing system if they wish to retain G.M. contracts. Firms who decide not to upgrade their manufacturing technology will not be able to compete for G.M. business.

3) Technology transfer generally takes two forms.

Although the scale of technology and the mechanisms by which it is transferred may be infinitely variable, the Committee recognized that there are basically two kinds of technology transfer.

The first is the transfer of existing technology to existing industry. The second is the transfer of entirely new products or processes from the prototype to the production stage.

The former type of transfer will be most often employed by older firms in established industries. Many of the government funded industrial assistance programs for research and development focus on this type of technology transfer. This form of technology transfer is limited, since it generally leads to productivity gains, not to new market opportunities.

The second type, which involves the start up of new companies, takes much longer to implement, however, it forms the basis for long-term economic growth. This form leads to new products and new markets, hence the prospects of considerable economic growth.

4) The lack of awareness by firms of the requirements for successful technology transfer are a significant problem.

In most cases, successful technology transfer requires specific management expertise as well as the appropriate "hardware". Many firms may become aware of what equipment or technology is available through industry associations and trade publications, but the management expertise required to implement the technology is usually an unknown. Management is often apprehensive about the structural changes dictated by new technology. Local industry has made limited use of the local educational institutions to assist in the selection or management of new technology. Further, it is unlikely that the institutions have the requisite degree of technological expertise in every field. Nonetheless, there may be potential for greater interaction between local industry and the institutions.

5) The economics of transferring technology to existing firms are often unfavourable.

The costs of acquiring new technology, either by licensing new technology or purchasing new machinery, is one of the most severe impediments to technological upgrading. Not only are the upfront costs high, but the "invisible" costs such as management and engineering consulting fees and the disruption of normal business operations are significant. Many of the firms that need new technology are under-capitalized to begin with because of the recession. In this situation, additional long-term debt to finance new technology is not easily obtained.

For firms that can afford the initial investment, the returns from adopting new technology often are not enough to warrant the capital expenditure, since, with Canada's small market, the marginal reductions in unit costs obtained by adapting new technology to existing processes are insufficient to offset the large upfront expenditure. Because of the costs involved, many firms in the printing and food processing industries will not try to pioneer the use of new technology. They are more concerned with whether or not the technology will be cost-effective and will tend to adopt new technology only after it has been introduced and proven elsewhere. One industry represented on the Committee suggests that management requires a return on investment of 25% to justify new capital expenditures. To achieve this level of return, technological upgrading of existing production must be

accompanied by new products and/or new market development if it is to occur.

6) Small firms are particularly constrained with respect to technology transfer.

The problems described above pose even more severe problems for small firms. The lack of access by small businesses to capital is especially critical; of equal impact is the lack of entrepreneurial experience and talent to help small firms.

In addition, where a small business is family owned or closely held, the owner(s) may not wish to pledge personal assets or give up equity in the company in order to finance purchases of new equipment. Several government programs like the Small Business Development Corporation (SBDC) legislation and the Small Business Loans Act have been established to provide incentives for investors to provide pools of capital for qualifying small business. However, these and other government assistance programs in manpower, technology and research areas are under-utilized by small business.

The Committee's experience has been that there is a general lack of awareness of applicable government programs. This may reflect the jack-of-all-trades nature of most small businessmen. They may not have the time to search out new innovations or government programs. Moreover, much of the advanced technology currently available is only applicable to larger scale, high-volume producers and is not easily transferrable to smaller firms. Existing retraining programs such as the provincial government's Training in Business and Industry (T.I.B.I.) program may also have to be fine-tuned for small business. Often the costs and time required for staff training in advanced technology is difficult for small firms to manage. It is often impossible for a key machine operator or skilled employee to take time off to attend training courses.

7) There appears to be a need for a broad-based "Innovation and Entrepreneur Assistance Centre" in Toronto.

The federal and provincial governments have already begun to address the problems of technology transfer to existing firms. However, limited attention has been paid to date on the development of new firms based on the use of new technology. The University of Toronto has established the Innovations Foundation to assist individuals and new firms bridge the gap between the inception of an idea within the university and its commercial exploitation.

However, the resources of the Innovations Foundation are very limited. What is needed is a more broadly based, multi-sectoral centre where entrepreneurs in a variety of fields can be encouraged. Such a centre could provide a supportive environment where new innovations/ideas could be developed and where business expertise would be available to help launch new firms marketing these innovations. There are precedents for such centres in Waterloo, Montreal and in some cities in the United States and it appears that the City could support such a venture with a view to assisting new high-risk (but high-potential) growth firms.

8) The garment industry in Toronto is faced with special challenges related to technology transfer.

Toronto's garment industry is faced with a double challenge. It is a highly labour-intensive industry which is not readily amenable to widespread mechanization. It is also faced with severe competitive challenges as a result of federal government trade policy. In addition to these factors, the garment industry suffers from all the problems related to technology transfer that have been identified above. Because of the importance of the garment industry to the City's employment base, and in view of the particular problems it faces, the City will have to pay special attention to this industry. Council is already considering a special garment industry committee to bring these and other issues to public attention. The industry itself has considered establishing a special resource centre to help firms deal with trade, labour and productivity issues. Although similar problems are faced by all the City's industry, the garment trades are particularly in need of assistance if they are to continue to be a viable sector and a major employer. A specialized garment industry institute such as the Pulp and Paper Institute at McGill University, Montreal, may be required.

9) The City has a role to play in technology transfer.

It is apparent that the City does have a role to play in helping its industry to adopt appropriate technology and in fostering new technological developments within its research institutions. It also has a role to play in facilitating new technology based industry. The City can help to raise industry awareness of existing opportunities for technology transfer. As a first step, and as part of its overall economic development strategy, the City can sponsor seminars by Ontario Government BILD Technology Centres. The ongoing industrial liaison program of the City could be utilized to help market the expertise of Ryerson, George Brown and the University of Toronto in their respective fields.

The City can take an active role in encouraging and possibly participating in the development of an Innovation and Entrepreneur

Assistance Centre. Such a centre could work to provide a focus for the existing technology transfer initiative of the University of Toronto and provide a "jumping off spot" for entrepreneurs who need a facility in which to fully develop their ideas. The City can work with the University of Toronto, the Canadian Industrial Innovation Centre in Waterloo and senior governments to develop a strategy for such a centre as soon as possible. If necessary, the City, through its proposed Development Corporation, could play a direct role in implementing the Centre once a strategy is in place.

The third area that the City could make a contribution is in the area of lobbying for additional research and senior government attention to the process of technology transfer. It is clear that there is a need for ongoing research on the effects of technology transfer on workers and on the economy as a whole. Because of the City's attempts to establish close contact to its industry, it is in a position to understand the changes in work force and industrial structure that technological change brings about. Such a task would require a commitment of a full time staff researcher.

At the same time, many of the major issues concerning technology transfer are clearly beyond the City's influence. For instance, municipal government has no mandate to provide direct financing for technological development or the transfer of new technology. Nor can the City assist in writing business strategies or identify new market opportunities for individual firms. Similarly, the City's influence in restructuring entire industries so that they become more viable and more productive is limited.

RECOMMENDATIONS

A) Measures Regarding the Transfer of Existing Technology

1) The City should continue to meet with industry associations, leading companies and union representatives to press for a better understanding of the impact of technology. A preliminary study should be undertaken, with an upset limit of $10,000 to further explore the issue of technologies and employment, job skills, and corporate concentration. Depending on the outcome of this preliminary study, additional studies may require additional funding.

2) The City should encourage all organizations involved in technology transfer, including organized labour, BILD, the IDEA Corporation, Ryerson, George Brown College and the University of Toronto to focus more specifically on the needs of City industries, and devise programs for the printing, garment and food processing industries.

3) The City should assist in promoting existing programs and services available at Ryerson, George Brown College and the University of Toronto to local industry through its Industrial Co-ordinating Committees and industrial liaison services.

4) The City should co-sponsor seminars with the Ontario government BILD Technology Centres to increase industry awareness of available technology and how to acquire and implement it, and what its implications are.

5) The City should hire one staff person on a full-time basis to be concerned with technological change and its impacts on City of Toronto industry.

6) Council should recognize that the introduction of new technology into existing industries will probably create job losses and that a provincial government response must be made to such job displacement. Responses should emerge out of Ontario experience, but consideration should be given to the responses of other jurisdictions such as social impact studies as well as appropriate retraining programs, recognizing their limitations.

Measures to Stimulate the Creation of New Technology

7) To encourage entrepreneurship and the start-up of new businesses, the City should actively participate with the University of Toronto, the Canadian Industrial Innovation Centre/Waterloo, senior levels of government and local industry to establish an innovation and entrepreneur assistance centre in Toronto.

8) The City should actively work with industry, labour and government representatives to investigate the need for a garment industry institute.

9) The City should explore ways of working with the National Research Council and other organizations to make available to industry and labour, experts in technology and productivity.

10) That the Commissioner of Planning and Development report to Council, within six weeks of consideration by Council of this report, on staffing and funding required to implement these recommendations.

11) That Neighbourhoods Committee adopt this report and forward it to Council.

The members of the Committee representing organized labour wish to record their dissent with the recommendations of the Committee.

They disagree with the premise that Toronto industry will be required to accept new technology because of competitive pressure or to improve productivity, or the production requirements of other firms.

Their dissenting views are appended to this report.

John Sewell
Chairman

(Communication dated March 27, 1984, from Bill Howes, C.W.C., Jim Turk, O.E., and Heather Webster, A.C.T.W.U., on behalf of the Labour Council of Metropolitan Toronto, addressed to Mr. John Sewell, Chairman, Technology Transfer Advisory Committee)

Re: Response to the Technology Transfer Committee Report

The February 27, 1984, draft of the report of the Technology Transfer Advisory Committee reconfirms basic concerns we have had about this committee since the outset.

As we indicated in our initial submission, we do not share the basic assumptions that led to the formation of the committee and which are taken for granted by most of the other representatives on the committee.

We have stated our many concerns throughout the committee's meetings and were pleased that the other committee members took our position seriously. The summary statement about "Organized Labour" (beginning on page 11) is a fair precis of our position on technology transfer.

Our difficulty with the final report is that it continues to reflect the assumptions with which we disagree. So, while there has been an attempt to accommodate our concerns in the final report, we cannot accept the fundamental thrust of the report.

Our disagreement is clearest in the section on "Findings". This section is the key to the whole report since the recommendations flow from it. And the most important finding is #2.

This finding, namely that "Toronto industry will be required to accept new technology, whether because of assumptions about competitiveness or improved productivity, or because of the production requirements of other firms", is not a position with which we agree.

The issues are far more complex, and this simplistic generalization misleads as much as it informs. What is at issue is the underlying model of Canada's economic development. This finding is based on the widely held premise that Canada must become internationally competitive to survive. We disagree with that premise. Given the underdevelopment of Canadian industry and the increasing world dominance of a relative handful of giant transnationals, the quest for international competitive advantage will be suicidal. There are alternative economic development models which offer some promise for Canada, but these do not raise technology transfer as a priority issue.

Recommendations 2, 3, and 4 flow directly from Finding 2. Since we do not accept the finding, we cannot agree to those three recommendations.

The other key finding is #9, namely, "the City has a role to play in technology transfer". Recommendations 5 and 7 flow from this finding. We feel any municipality has a very minor role to play in technology transfer, given the powers and level of activity of the federal and provincial governments and the economic limits of the municipal property tax base.

Accordingly, we cannot agree that the taxpayers of Toronto should pay for a full-time staff person to do research on "facilitating technological change" (Recommendation 5) nor do we feel that the cost to the City of an "innovative technology centre" (Recommendation 7) can be justified in terms of the minimal effects such a centre would have.

There are two recommendations that seem to be a response to labour's position — #1 and #6. We believe a brief comment on each is in order.

#1 Research to "explore the issue of technologies and employment, job skills, and centralization" is certainly merited, but nothing of use can be done for $10,000. That amount would probably not even pay for the computer time to analyze existing Statistics Canada data. While we appreciate the nature of the suggestion, we do not feel a $10,000 study would be of much use in a project of this scope.

#6 While we agree that a Provincial Government response to the question of job loss because of the introduction of new forms of technology is necessary, we are disappointed that the committee recommendation does not call on the city to actively lobby the Government for legislation. Nor does the recommendation suggest a role for the City in mediating the impact of technology transfer; encouraging technology which is helpful to the community in terms of job creation and discouraging technology which causes job loss or deskills work.

Conclusion: While we appreciate the manner in which this committee has worked and its attempts to reconcile divergent points of view, we simply cannot let our names be put on a report that is fundamentally contrary to the majority of residents of Toronto. It is obvious that the committee accepts uncritically the desireability of technology transfer despite its recognition of the fact that technology will cause job loss and increased economic and social costs associated with high levels of unemployment. If we felt that it were simply a matter of rewording a few parts of the report, we would ask that that be done. But since it is a matter of significant differences that cannot be brought together, we will have to agree to disagree. We trust that our unwillingness to sign the final document will be conveyed in all reports of the outcome of this committee.

We urge that the committee recommendations be turned down by the Neighbourhoods Committee and City Council.

The Committee also submits the communication (April 4, 1984) from Mr. Wally Majesky, President, Labour Council of Metropolitan Toronto:

We are coming to your Committee regarding the report of the Technology Transfer Advisory Committee. The Labour Council had three representatives appointed to that Committee:

Bill Howes, Communication Workers of Canada;

Jim Turk, United Electrical Workers; and

Heather Webster, Amalgamated Clothing and Textile Workers Union.

Given serious concerns with the work programme and final recommendations of the Committee, our representatives have decided not to sign the final report but to submit to you a minority report explaining our objections (attached to Committee's report). We are also attaching, for your information, a letter our representatives submitted to the Committee after its first meeting.

In summary, we do not think it is the role of the City to facilitate the transfer of technology to Industry. There are many myths about the importance of technology. We believe that a careful examination of the whole picture will reveal that facilitating technology transfer will compound Toronto's problems.

What are some serious problems the introduction of technology causes? An obvious one is job loss. As an example, consider the loss of jobs for telephone operators brought about by the introduction of technology. Using figures for Ontario and Quebec we have lost about 50% of these jobs since 1957.

1957: 10,600 full-time telephone operators

1981: 5,262 full-time telephone operators.

This has happened despite an increase in long distance calls since 1957. Using the same industry, we ask you to consider some "secondary effects", i.e. effects on one group of jobs because another group of jobs has had technology introduced. Example: buildings with a large number of telephone operators have had cafeterias which are staffed. As the number of operators decreases dramatically, the need for a staffed cafeteria diminishes. This has happened in at least three buildings in Toronto where cafeterias have been closed and vending machines installed. We could give many more examples. The point is that the transfer of technology to workplaces means a loss of more jobs and higher unemployment. We urge you not to have the City involved in encouraging that kind of scheme.

Most politicians and residents are concerned about high unemployment. Unfortunately, many misappropriately believe that new technology will increase the number of new jobs. That is not true. In fact, at the final meeting of the Technology Transfer Committee, most Committee members agreed that the City has to expect a loss of jobs as technology use is increased. Not only are we dealing with job loss, it is important to consider where we can expect any newly-created jobs to come from. The Institute for Research on Educational Finance and Governance did a study called the Education Implications of High Technology. That study concluded:

> "Most new jobs will not be in high technology occupations, nor will the application of high technology in existing jobs require a vast upgrading of the skills of the American labour force." (Page 2)

The study also states:

> "The total number of new jobs generated in these and other high technology occupations will be vastly outweighed by employment growth in other areas. Slower-growing occupations with a large employment base are expected to contribute far more jobs to the economy than high technology occupations. Of the twenty occupations expected to generate the most jobs in the economy during this period, not one is related to high technology." (Page 4)

We encourage you to avoid the trap of trying to solve unemployment and investment problems by putting the City's eggs into the high tech. basket. The transfer of technology leads to de-skilling jobs and loss of jobs. As more people become unemployed, the City will face social costs associated with high levels of unemployment.

You are not dealing with the issue of whether or not technology should be introduced into workplaces. That is happening. As well, you are not dealing with the issue of possible protection to workers or forms of Provincial and Federal legislation needed to deal with problems of new technology. That is happening through collective bargaining and Federal/Provincial activities. What we are asking you to do is to recognize that there are many unanswered problems related to the transfer of technology to Industry. The Committee has asked to assign a full-time staff person to that facilitating role. We are asking that you not use the property tax base for this type of activity.

(Communication dated November 4, 1983, from Mr. Wally Majesky, and Labour Members of the Technology Transfer Committee, Bill Howse, Jim Turk, and Heather Webster, addressed to Mr. John Sewell, Chairman, Dick Gilbert and Members of the City of Toronto's Technology Transfer Committee)

The Labour Council of Metropolitan Toronto was quite concerned when we learned of the terms of reference and agenda presented to the City's Technology Transfer Advisory Committee at its first meeting. It is not overstating the case to claim that we think the Committee is ignoring major issues of prime concern to labour.

It would seem to us, the predominant and underlying purpose of the Committee seems to be one of finding ways the City can asist in the transfer of technology to key Toronto industries. All the sessions of the Committee address only how that process may be facilitated, except for the new Session 3A which also asks how the City can keep its existing and attract new "technology-intensive" firms.

While these are undoubtedly important from a management point of view, to us as workers being affected by new technology, there are additional questions which must be addressed.

For example, the Committee's whole approach seems to take the shape of technology for granted, asking simply how we can get more of it into the hands of Toronto's employers. For us, the issue is not the amount of technology that employers have, but the nature of that technology.

The technological capabilities which humankind presently possesses have untold possibilities to better our lives and to worsen them. When we in the labour movement look at technology, we immediately ask the question of whether given technologies will contribute to, or take away from, both the number of jobs and the quality of those jobs.

Most technology we face in most work places has been designed to replace labour and to take skill and control away from the workers that remain. When we raise these points, we are usually accused of being "against technology" or "against change". Technological change is held out as inevitable and we are portrayed as present day luddites for raising our concerns.

The fact is, however, that technology is produced in certain forms, and not others, because of the decisions of the scientists who develop the technology and the corporations and governments that fund the research.

When the City of Toronto looks into the question of technology, we would expect that it would do so fairly - being concerned both about the interests of employers and workers.

Concretely, that means the Committee should not see its mandate as simply exploring how employers can get the technolgoeis they want as easily and cheaply as possible. It should also be exploring how it can assist in the placement of technologies that will serve the interests of Toronto's workers - technologies that will make work more challenging, that will give more control to workers, that will make work safer, as well as making it more productive.

Sessions should be added to the Committee's agenda which address the following questions:

1. After the presently scheduled Session Two, there should be a session on "How Can New Technologies Be Transferred Which Meet Workers Needs?" (This has implications for the original Session Three. That session should also be addressing the role of educational research institutions in helping design technology to a positive impact on workers.)

2. There should be a session exploring the impact of the City of Toronto if it emphasizes the attraction of new "technology-intensive" firms and the technological upgrading of existing firms. It is taken for granted that this is necessary and desirable, although research on areas that have followed this strategy shows there can be serious problems created.

3. There should be a session on how the City can facilitate the linking of workers and research and educational organizations to have more input into technological development. This would parallel the issues that are to be raised in Session Four which looks at links between industry, research and educational institutions.

4. Session Five should be modified so that it includes how to facilitate the transfer of technology that is consistent with the needs not only of industry, but also of workers and the community.

We honestly cannot see how we can have representatives on this committee and in turn play a useful role unless there is an attempt to basically broaden and enlarge the terms of reference of the Committee. We would appreciate an early response to our concerns.

The Committee also submits the communication (May 2, 1984) from Alderman Gilbert:

Regrettably, as a member of this committee, I find myself in disagreement with its recommendations. The purpose of this letter is to recommend that you receive the report of the committee and, instead, adopt recommendations that would, if successfully implemented, give a substantial boost to industry in Toronto by enhancing import substitution.

The committee has done a valuable job by alerting City Council to some of the issues surrounding (i) the introduction of technological improvements into existing industry, (ii) the development and manufacture of new products based on advanced technology, and (iii) the possible involvement of the City of Toronto in the facilitation of (i) and (ii).

In my view, the City should not get involved in the business of transferring technology to existing industry for two reasons:

(a) In the remote event that municipal involvement were to lead to the adoption of technological improvement, workers would likely be strongly affected as a result of that involvement - probably in an adverse manner. The City does not have the power to undo the damage that might be caused by the introduction of technology, and therefore it should be extremely cautious about getting involved in this kind of activity.

(b) Involvement of the City in the myriad of questions concerning technological change could be done in a competent manner only with considerable investment of scarce resources. Our fledgling Economic Development Division may be better expended on more modest and probably more effective enterprises such as the one suggested below.

In my view, the City should not hang its hat on new, technologically based industries as salvation for its declining industrial base. The very essence of such undertakings is their uncertainty of success. The City's few resources should not be expended on what amounts to an industrial lottery. We should hitch our frail wagon to enterprises that have some reasonable and early chance of success.

Rejection of the Committee's recommendations would not mean that City Council is being Luddite in its response to technological change. It would mean simply that the matter had been considered and found to be beyond the City's means to become involved in an effective and socially responsible manner.

The question remains as to what our Economic Development Division should do if it is denied the chance to deal with matters of high technology. I believe that the most cost-effective thing that could be done by that division would be a systematic push to substitute items manufactured in Toronto for items imported into Toronto. The Neighbourhoods Committee might want to suggest a strategy for the Economic Development Division to begin acting on.

Such a strategy would start with identifying things that are imported into Toronto in great quantities that could be made in Toronto. They could be very mundane items such as light switches, typewriter and printer ribbons, bicycle pumps, staple guns, woks, and snow shovels. They could be arcane essentials for the machinery of Toronto's biggest business - office activity. A useful thing for our Economic Development Division to do would be to develop an inventory of 200 such items, and then work with local businesses and educational institutions to examine the feasibility of replacing the importation of 20 or 30 of the most likely candidates, using every wrinkle of new technology that can be applied. The City should set a specific target of replacing (say) $250,000,000-worth of current imports by the end of the decade. This would create at least 30,000 manufacturing jobs in Toronto, and thus increase our total of this kind of job by at least 50%.

Recommendations:

1. That the report of the Technology Transfer Committee be received.

2. That the Economic Development Division of the Planning and Development Department be given a mandate to engage aggressively in the business of promoting the substitution of

locally manufactured goods for goods manufactured elsewhere, and be requested to develop a strategy for this purpose, perhaps along the lines of the one suggested above, for presentation to this Committee.

The Committee also submits material filed by Alderman Martin:

The Garment Workers' Centre is proposed for the following reasons:

1. The industry is undergoing technological change and other important challenges; it needs a workforce which is healthy, has opportunities for continuous training, and is willing to make a commitment to long term employment in the industry.

2. To provide strategies for improving the industry by giving workers a chance to improve themselves.

3. To provide an opportunity for workers to work together to improve working conditions and benefits.

4. To provide general community services all in once place.

A. Education for employed and unemployed workers

ESL and Literacy Programme

- to break down communication barriers between workers

Skill Retraining, Academic Upgrading and Labour Education

- to better prepare the workforce to cope with new technological changes
- to provide education for workers who wish to attain a high school education
- to provide practical workshops on how to organize the unorganized, workshops on racism and sexism, union counselling about the legal rights of workers and courses on the operation of the union.

B. Community and Social Services

- to enhance the accessibility and delivery of services, the centre will provide a rental space to a number of community agencies all under one roof.

C. Resource Development

- the centre will house a number of resource facilities to further contribute to workers' development and participation.

D. Childcare

- in order to promote the participation of women workers, emergency daycare services and a regular day programme will be available.